

to destruction by a falling weight, and the material invariably so in tension.

Again, some members of a girder are in tension, others in compression, while practically all are passed on the measure of their qualities given by the tensile test. For a certain elastic limit and maximum stress the highest elongation and reduction in area are assumed to indicate the toughest steel. For materials where great toughness is of paramount importance, the tensile, cold bending, and even quenched bending are typical tests, and on the whole they have served well; but in perhaps one case out of many thousands mild steel snaps in use without elongation after satisfying all ordinary tests for ductility. Cases such as these, which, though rare, may entail great loss of life or, as in the case of certain parts of vessels of war, might mean disaster to a whole crew, have probably been the exciting cause which has set men on the search for some means of detecting these rare cases where the risk would justify the extra expense.

It is evident that this case of one in thousands cannot be touched by experiments on (to quote the author) "no less than five tons of various kinds of specially manufactured metal," for that particular one must be found by the real test of failure in ordinary use and experiments made on it. The author's unconditional advocacy of the plain tensile and bending tests, and scornful reference to the others, indicates either that he is happy in a paradise which need not be specified or that many eminent practical and scientific engineers and metallurgists are at the present day unnecessarily anxious. No one would advocate the abolition of the tensile tests, as they are required for the engineer's calculations, and are generally a sufficient guarantee of trustworthiness. The sole contention is that in certain special cases something more is necessary.

The reviewer has been engaged during the last two years with Prof. Arnold on this very matter, subjecting steels known to have failed in use to Arnold's alternating stress and other tests with a view to find a practical system which will eliminate those possessing this curious brittleness. Two steels, one the best modern make of boiler plate, the other a steel which gave passable tensile tests and bent close double without a sign of distress, yet broke during the official hydraulic tests, gave very different results under the special alternating stress test. These statements having reference to facts, no study of comparative tests on specially manufactured steels can strike at the root of the matter. Although to certain mechanical testers and men of figures the variations in some of the results from the newer methods may look somewhat formidable when presented as percentages, the fact remains that these tests have picked out dangerous steels which had satisfactorily passed tensile and bending tests. Therefore some such new system of testing claims the special attention of the designer of high-speed and other work where large issues, and possibly loss of life, would be involved by the failure of a member.

This volume is the Carnegie gold medal thesis for the year, and deals with experiments on tensile tests, on plain and on notched bars, slowly applied. Many

figures are given on the effect of size and form of notch. Plain and nicked bends slowly applied and as impact tests are also considered, but excuse is made that the subject is so large that it could not be adequately dealt with. The present writer is firmly convinced that it would count more for real solid progress if the Carnegie scholars were encouraged to take a smaller field and explore it more thoroughly, for to a steel metallurgist a brief paper embodying definite and concrete results is far more valuable than a voluminous and indefinite thesis. It is worthy of note that the 0.7 per cent. and 0.4 per cent. carbon steels contained 0.34 per cent. and 0.22 per cent. silicon respectively, amounts that would debar their acceptance under British specifications, not on account of the tensile tests, but because of their suspected greater liability to break under vibration.

A. McW.

CHEMISTRY OF THE PROTEIDS.

Chemie der Eiweisskörper. By Dr. Otto Cohnheim. Zweite Auflage. Pp. xii + 313. (Brunswick: Vieweg und Sohn, 1904.) Price 8.50 marks.

ALTHOUGH only four years have elapsed since the first edition of this work appeared, the great advances made in our knowledge of the chemistry of the proteids have necessitated a considerable revision of the book. The author, however, has found it possible to avoid any enlargement of the work by altering the order of subjects treated, and by stating the facts more concisely than in the previous edition. Some of the alterations in arrangement appear somewhat difficult to justify. Thus, for example, in the earlier edition the physical characters were dealt with prior to the consideration of the more purely chemical properties of the proteids, while in this edition the order is reversed. As the first edition has been already reviewed in NATURE, only a brief account of the chief additions to the second will be necessary.

Perhaps the most important recent additions to our knowledge have consisted in the more complete separation and identification of the products of the hydrolytic decomposition of the proteids. Dr. Cohnheim gives an excellent account of the results obtained in this field by E. Fischer and his pupils by means of the method of fractional distillation under reduced pressure of the ethyl esters of the amino-acids. This method has secured a much more complete separation of the amino-acids than any methods previously employed, although the results obtained are still far from quantitative. By its use E. Fischer has been able to prove that certain amino-acids, namely, α -amino-valerianic and α -amino- β -oxypropionic acids, are much more widely distributed products of proteid hydrolysis than has been hitherto supposed. Fischer has also succeeded in separating two acids, namely, α -pyrrolidine-carboxylic and oxy- α -pyrrolidine-carboxylic acids, which were hitherto unknown as products of the decompositions of proteids. The latter acid was isolated from the residue remaining after distilling off the esters of the amino-acids. A full account is also given of recent work on the more complete chemical characterisation of the amino-acids, including the separation of several into optically active isomers.

The isolation and determination of the probable constitution of tryptophane by Hopkins and Cole, and that of oxyphenylæthylamine by Langstein and Emerson, may also be mentioned as some of the most important additions to our knowledge of the products of the hydrolysis of the proteids by the action of trypsin. Dr. Cohnheim appears to have omitted to mention the discovery of the latter substance.

Our knowledge of the chemistry of the diamino-acids and other basic products of hydrolysis has not been so markedly increased. The constitution of histidin has not yet been determined, although the evidence so far obtained points to it being a pyrimidine derivative. The discovery by Herzog that it gives the biuret reaction is of much importance in view of the fact that this test has been used to distinguish between the more complex products of proteolysis which still retain proteid characters and the simpler chemical bodies resulting from more complete decomposition.

The tables compiled by Dr. Cohnheim which give the nature and quantity of the products of hydrolysis of various proteids and albuminoids form a very useful addition to the book.

The third chapter of the general part of the work gives an interesting account of the chief views held with regard to the constitution of the proteids. The most interesting advance in this field is due to E. Fischer, who has shown that the amino-acids possess in a marked degree the power of reacting with one another to form more complex bodies. The prototype of these substances—glycylglycin—results from the union of two molecules of glycine with the elimination of the elements of water, the amine group of the one molecule reacting with the carboxylic group of the other to form an amide. By extending this synthesis Fischer has succeeded in preparing compounds of three or more molecules of various amino-acids to form compounds which he terms polypeptides. Some of the more complex polypeptides resemble peptones in many of their chemical properties.

In the special part of the work the section on the proteids of plants has been much extended. The section on nucleoproteids gives a good account of recent work elucidating the constitution of the pyrimidine derivatives, uracil, thymine, and cytosine. Considerable additions, embodying the work of Nencki and Zaleski, and of Küster on the decomposition of hæmatin, have also been made to the chapter on the blood pigments.

The second edition of the work well maintains the high standard for completeness and accuracy secured by the first one.

OUR BOOK SHELF.

Elements of General Radio-Therapy for Practitioners. By Dr. Leopold Freund, Vienna. Translated by Dr. G. H. Lancashire. Pp. xix+538; illustrated. (New York and London: Rebman, Ltd., 1904.) Price 21s. net.

DR. FREUND is so well known to English workers in electrotherapeutics that any work written by him will be welcome. To his earliest writings the profession is largely indebted for the first experimental work in

radio-therapy, and the results were sufficient to indicate the possibilities of X-rays in therapeutic work as well as in diagnosis. The work before us shows that Dr. Freund has based his experimental research upon a thoroughly scientific knowledge of what has been done by others as well as by himself, and consequently all workers with X-rays will feel indebted to him for his book and gratefully acknowledge this.

In his preface Dr. Freund states that he has attempted to bring the essential features of a recent form of treatment before the notice of a larger circle of medical men, that he has tried in a comprehensive way to explain the technique, the indications for treatment and the results to be expected, while at the same time tabulating and arranging the fundamental physical laws so as to explain the physiological effects. That he has succeeded no one will doubt who reads the work, and that the views of others have not been forgotten is made evident by the fact that he quotes more than eight hundred writers upon the subject. The author admits that this branch of science can hardly be said to be more than in its infancy, that there are gaps in our knowledge to be filled in and errors to be corrected; but notwithstanding the doubt expressed in some quarters we have already achieved brilliant theoretical and practical results which lead him to hope that radio-therapy will obtain an acknowledged place among our methods of treatment. In support of this view he says one need only refer to the undeniable and astonishing results already achieved in skin disease.

After a short but expressive introduction referring to the physical aspect of the question, Dr. Freund divides the work into five sections. The first deals with the elements of electricity, and this section should be useful to medical practitioners who are desirous of obtaining the acquaintance with physics necessary to understand this special branch of surgery. The second part treats fully of high-frequency currents, the third section is devoted to X-rays, the fourth to Becquerel rays, and the fifth to treatment with heat and light rays.

A careful perusal of the different chapters will convince anyone that Dr. Freund has fully succeeded in his aims; and that the text-book under notice will become a popular one is certain. That it will be regarded as one of the standard works on the subject no one can doubt.

English workers are largely indebted to Dr. Lancashire for his excellent translation of the work, and to Mr. Clarence A. Wright for his notes on instrumentation published in connection with the English edition, which are introduced at the end of the book.

The whole is clearly and scientifically written. There are one hundred and seven illustrations taken from the original text, and the author, translator, and publisher are to be congratulated upon the success of their efforts.

Physiography. An Introduction to the Study of Nature. By T. H. Huxley. Revised and partly rewritten by Prof. R. A. Gregory. Pp. xi+423; with 301 illustrations. (London: Macmillan and Co., Ltd., 1904.) Price 4s. 6d.

THE task of revising and bringing up to date Huxley's inspiring text-book of physiography was one not to be lightly undertaken, but it could not well have been placed in better hands than those of Prof. Gregory. In spite of the many fine qualities of the original volume, and of the author's belief that its methods could be adapted with little difficulty to any locality by an intelligent teacher, it can scarcely be questioned that the usefulness of the book was somewhat restricted by its special reference to the Thames and its basin.